

# Laboratory Studies of Astrophysically Significant Carbon Molecules And Ions in Support of Space Missions

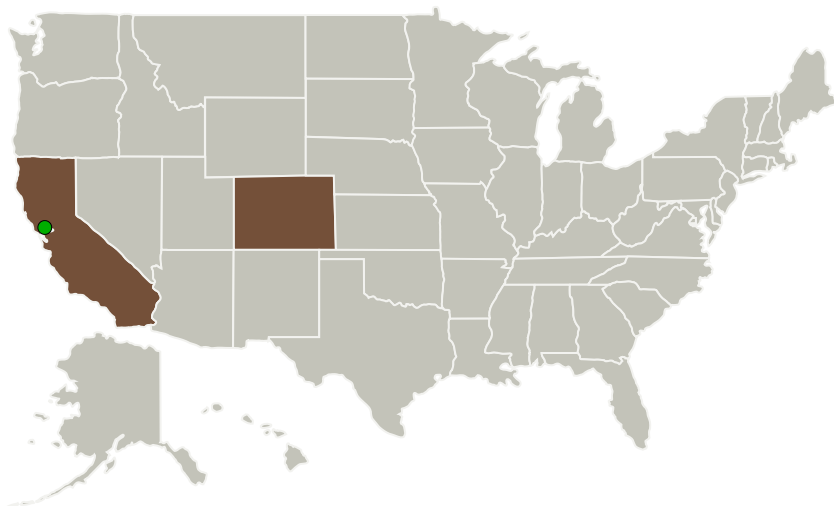
Completed Technology Project (2015 - 2018)



## Project Introduction

We intend to investigate the spectral properties and energetic characteristics of carbon-bearing molecules and nanosized molecules of interest to the Astrophysics Research and Analysis Program. Using Ames unique laboratory facility, the Cosmic Simulation Chamber (COSmIC), which combines a supersonic jet expansion with cavity ringdown spectroscopy and Reflectron time-of-flight mass spectrometry, we will measure for the first time laboratory spectra of large carbon molecules, radicals and positive and negative ions that can be directly compared to space data for the unambiguous detection of specific species in space. We will also monitor the formation of carbon clusters and nanomolecules from molecular precursors and measure their spectral signatures. These laboratory data are crucial to the support of planned missions (JWST) and to on-going, recently-serviced missions (SOFIA, COS/HST, Herschel). The goal is also to address some of the most fundamental unresolved issues in astrophysics: the molecular inventory of the interstellar medium and its relationship to molecular complexity and ultimately to the origin of life, the formation of interstellar dust from gas-phase atoms and molecules. These goals are the focus of current as well as future (post-HST era) missions considered by NASA.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California



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## Organizational Responsibility

### Responsible Mission Directorate:

Science Mission Directorate (SMD)

### Responsible Program:

Astrophysics Research and Analysis

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## Primary U.S. Work Locations

California

Colorado

## Project Management

### Program Director:

Michael A Garcia

### Program Manager:

Dominic J Benford

### Principal Investigator:

Farid Salama

### Co-Investigators:

Ella M Sciamma O'brien

Xander G Tielens

Jessie L Dotson

Theodore P Snow

Timothy J Lee

## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.3 In-Situ Instruments and Sensors
    - └ TX08.3.1 Field and Particle Detectors

## Target Destination

Outside the Solar System